Stockpile Stewardship era: 1989–present

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High-fidelity 3D simulations require incredible technological leaps from gigaflops to teraflops to petaflops to exaflops

As the 1980s drew to a close, Los Alamos continued to drive the evolution of supercomputing. The Lab partnered with Thinking Machines Corporation to develop the massively-parallel Connection Machine series that focused on quantity over quality: using thousands of microprocessors (not more powerful ones) to perform numerous calculations simultaneously. This took Lab computing into the gigaflop zone (one billion floating-point operations per second) by 1990.

But then the Cold War came to an abrupt end in 1991 and nuclear weapons testing ceased in 1992. To ensure the continued safety, security, and reliability of the nation's nuclear deterrent, President Bill Clinton and the Congress created the Stockpile Stewardship Program in 1994. In lieu of underground nuclear weapons testing, this law called for "an increased level of effort for advanced computational capabilities to enhance the simulation and modeling capabilities of the United States with respect to the detonation of nuclear weapons."

Suddenly, it was necessary to rapidly develop supercomputers powerful enough to replace real-world nuclear testing with virtual testing. This meant eventually being able to create simulations in 3D. Increasing speed was important, but to be really useful, 3D simulations with high resolution and accuracy were even more important. To achieve high-fidelity 3D simulations, computing would need to make incredible technological leaps from gigaflops to teraflops (trillions, in 1999) to petaflops (quadrillions, in 2008) to exaflops (quintillions, coming soon).


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